Claims:

1. A method for performing a finish machining of a tooth surface of a gear to be machined being characterized in that in the state that at least one counter gear is meshed with said gear to be machined, said gears are rotated while supplying water or an aqueous solution containing no abrasive grains to meshing portions of said gears whereby a surface with small surface roughness is formed on said tooth surface of said gear to be machined.

2. A method for performing a finish machining of a tooth surface according to claim 1, wherein said counter gear is actual gear which is used in combination with said gear to be machined or a gear having the same profile as said gear to be machined in actual use.

3. A method for performing a finish machining of a tooth surface according to claim 1, wherein said counter gear exhibits more excellent oxidizability than said gear to be machined.

4. A method for performing a finish machining of a tooth surface according to claim 1, wherein said gear to be machined and said counter gear are rotated in the state that a pressure of equal to or more than 5 Pa is applied between tooth surfaces of said both gears which are brought into contact with each other at meshing portions.

5. A method for performing a finish machining of a tooth surface according to claim 1, wherein said tooth surface of said

counter gear has a surface roughness Rz which falls in a range of 0.5 to 10.

6. A method for performing a finish machining of a tooth surface according to claim 1, wherein said aqueous solution contains at least one of fluorinated acid, nitric acid, oxalic acid, hydrogen peroxide, sulfuric acid, hydrochloric acid and sodium chloride.

7. A method for performing a finish machining of a tooth surface according to claim 1, wherein said gear to be machined and said counter gear are meshed with each other while having axes of said both gears arranged in parallel and are rotated while performing the relative reciprocating movement in the axial direction.

8. A method for performing a finish machining of a tooth surface according to claim 1, wherein said gear to be machined and said counter gear are meshed with each other while having axes of said both gears arranged in parallel and are rotated while repeating the expansion and narrowing of a distance between said axes of said both gears.

9. A method for performing a finish machining of a tooth surface according to claim 1, wherein said gear to be machined and said counter gear are meshed with each other while having axes of said both gears arranged in parallel and are rotated while reciprocably tilting at least one shaft from a parallel state with respect to the other shaft at a given angle.

10. A method for performing a finish machining of a tooth surface according to claim 1, wherein said gear to be machined and said counter gear are rotated while having axial directions of said both gears to intersect each other at an approximately right angle.

11. A method for performing a finish machining of a tooth surface according to claim 1, wherein said gear to be machined and said counter gear are rotated while relatively moving a contacting position in the state that said both gears are meshed with each other.

12. A method for performing a finish machining of a tooth surface according to claim 1, wherein said gear to be machined or said counter gear are rotated until the vibration and noises derived from said meshing reach a desired magnitude.

13. A method for performing a finish machining of a tooth surface according to claim 1, wherein said gear to be machined and said counter gear are rotated until the surface roughness of said tooth surface of said gear to be machined reaches a desired magnitude.

14. A method for performing a finish machining of a tooth surface according to claim 1, wherein said meshing of said gear to be machined and said counter gear is performed 10000 to 20000 times.

15. A method for performing a finish machining of a tooth surface according to claim 1, wherein said rotation is performed

while measuring the vibration or noises derived from said meshing and said rotation is finished based on a measured value of said vibration or said noises.

16. A method for performing a finish machining of a tooth surface according to claim 15, wherein said measurement of said vibration or said noises is continuously performed at fixed or unfixed intervals and said rotation is finished at a point of time that an obtained measured value becomes smaller than a given value.

17. A method for performing a finish machining of a tooth surface according to claim 15, wherein said measurement of said vibration or said noises is continuously performed at fixed or unfixed intervals and said rotation is finished at a point of time that an obtained measured value is increased three or more times continuously.

18. A method for performing a finish machining of a tooth surface according to claim 16, wherein said measurement of said vibration or said noises is continuously performed at fixed or unfixed intervals and said rotation is finished at a point of time that an approximation formula $aX + B$ on the time-sequential change of an obtained measured value with respect to time X is obtained and a gradient a of said approximation formula turns from negative to positive.

19. A method for performing a finish machining of a tooth surface of a gear to be machined and a tooth surface of another

gear to be machined being characterized in that in the state that at least one another gear to be machined is meshed with said gear to be machined, said gears are rotated while supplying water or an aqueous solution containing no abrasive grains to meshing portions of said gears whereby a surface with small surface roughness is formed on said respective tooth surfaces of said gear to be machined and said another gear to be machined.

20. A gear having a tooth surface thereof subjected to a finish machining on said tooth surface to obtain a surface of small surface roughness, wherein

said finish machining of said tooth surface of said gear is performed by a method for performing a finish machining of a tooth surface according to claim 1.

21. A device for performing a finish machining of a tooth surface of a gear to be machined, said device comprising:

a first rotary shaft which rotatably supports said gear to be machined thereon,

a second rotary shaft which rotatably supports a counter gear which can be meshed with said gear to be machined thereon, and

water supply means which supplies water or an aqueous solution containing no abrasive grains to meshing portions of said gear to be machined and said counter gear,

wherein said gear to be machined and said counter gear can be rotated while supplying said water or aqueous solution

to said meshing portions.

22. A device for performing a finish machining of a tooth surface according to claim 21, wherein a liquid reservoir portion which receives said water or aqueous solution is disposed below said gear to be machined and said counter gear, and said device further includes liquid circulation means which filters said water or aqueous solution stored in said liquid reservoir portion and supplies said water or aqueous solution to said meshing portions again.

23. A device for performing a finish machining of a tooth surface according to claim 21, wherein said device includes torque adjustment means which applies a given pressure between contacting tooth surfaces at said meshing portions of said gear to be machined and said counter gear.

24. A method for performing a finish machining of a tooth surface according to claim 21, wherein said device for performing a finish machining of a tooth surface includes rotary shaft moving means which generates the relative movement of said first rotary shaft and said second rotary shaft in such a way that a contacting position at said meshing portions of said gear to be machined and said counter gear is changed.